

Pin Chen
Jet Propulsion Laboratory, California Institute of Technology, Mail-Stop 183-301, 4800 Oak Grove Drive,
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EDUCATION

<i>California Institute of Technology, Pasadena, CA, USA</i>	
Ph.D. in Chemistry (chemical physics)	June, 1999
Dissertation: "Terahertz Generation via Optical-Heterodyne Conversion: Development of a New Far-Infrared Spectrometer and Its Applications toward a Better Understanding of Nonrigid, Astronomically Important Molecules."	
<i>University of California, Berkeley, CA, USA</i>	
B.S. in Chemistry	December, 1991

SELECTED AWARDS & HONORS

• JPL Team Bonus Award for the "successful balloon flight of the Planetscope Precursor Experiment."	2008
• NASA Group Achievement Award for the "Molecular Spectroscopy Team."	2006
• NASA Group Achievement Award for the "Aura Microwave Limb Sounder Instrument Team."	2005
• NASA Group Achievement Award for the "Balloon Observations of the Stratosphere Team."	2004
• NASA New Investigator in Earth Science (funding award).	2002 – 2005
• National Research Council's Postdoctoral Research Associateship.	1999 – 2000
• NASA New Technology Report Award for "Tunable Terahertz Source Using Near Infrared Diode Lasers."	1999

EXPERIENCE

<i>California Institute of Technology, Pasadena, CA, USA</i>	
Visiting Associate	2007 – Present
<i>Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA</i>	
Research Scientist	2006 – Present
<i>Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA</i>	
Group Supervisor (acting, Atmospheric Laser Spectroscopy Group)	12/2006 – 2/2007
<i>Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA</i>	
Scientist	2000 – 2006
<i>National Institute of Standards & Technology (NIST), Boulder, CA, USA</i>	
Research Chemist (post-doctoral)	1999 – 2000
<i>California Institute of Technology, Pasadena, CA, USA</i>	
Graduate Research Assistant	1992 – 1999
<i>Air Instruments & Measurements, LLC, Baldwin Park, CA, USA</i>	
Consultant	1997 – 1998
<i>Lawrence Berkeley Laboratory, Berkeley, CA, USA</i>	
Undergraduate Research Assistant, Research Associate (approximate title)	1990 – 1992,

1988 – 1989

PI FUNDING AWARDS

<i>NASA Mars Fundamental Research Program (MFRP)</i>	\$255.3K
"Kinetic-Isotope Effects of Key Photochemical Reactions on Mars"	2007 – 2010
<i>NASA Planetary Instrument Definition & Development Program (PIDDP)</i>	\$636.8K
"A New <i>In-Situ</i> Measurement Technique for Stable-Isotope Analysis of Methane and Other Important Atmospheric/Volatile Species on Mars"	2005 – 2008
<i>JPL Innovative Spontaneous Concepts (ISC)</i>	\$30K
"Proof of a Novel Concept for Measuring Optical Properties of Aerosols"	2006
<i>JPL Research & Technology Development Program (R&TD)</i>	\$343K
"A Promising New Near-Infrared Laser Technique for <i>In-Situ</i> Mars Exploration"	2003 – 2005
<i>NASA New Investigator Program in Earth Science (NIP)</i>	\$346.4K
"Tropospheric Monitoring of CO Isotopes by Cavity-Enhanced, Optical Heterodyne Spectroscopy"	2002 – 2005

CO-I FUNDING AWARDS

<i>NASA Planetary Instrument Definition & Development Program (PIDDP)</i>	
"Aquarius: An <i>In Situ</i> Water Isotope Analyzer for Exploring Planetary Ice"	2008 - 2011
<i>JPL Research & Technology Development Program (R&TD)</i>	
"Advanced InGaAs-based Single-Mode Semiconductor Lasers for Atmospheric Sensing and Lidar"	2002 – 2005
<i>JPL Bio-Nano Technology Program</i>	
"Quantum Dot Lasers for NASA <i>In-Situ</i> Sensing Applications"	2002 – 2005

INVITED LECTURES/SEMINARS

<i>The Center for Adaptive Optics Fall 2007 Retreat, Lake Arrowhead, CA, U.S.A.</i>	
"Stratospheric seeing & contrast limits for a balloon-borne coronagraph"	November, 2007
<i>Yuk Yung Lunch Seminar Series, California Institute of Technology, CA, USA</i>	
"Noise-immune, cavity-enhanced spectroscopy and ultra-sensitive atmospheric measurements"	February, 2006
<i>"Enlightenment Lecture", Nippon Institute of Technology, Japan</i>	
"Optoelectronic terahertz sources based on photomixers"	February, 2003

TEACHING/MENTORING EXPERIENCE

<i>California Institute of Technology, Pasadena, CA, USA</i>	
Graduate Student Mentor/Ph.D. Thesis Committee Member	2003 – present
Mentoring chemistry graduate students conducting research in spectroscopic instrumentation.	
<i>Jet Propulsion Laboratory, California Institute of Technology, CA, USA</i>	
Undergraduate Student Mentor	2007 – present
Mentoring summer underground graduates students conducting research in spectroscopic	

instrumentation.

Nippon Institute of Technology, Saitama Prefecture, Japan

Invited Lecturer

2003

Presented four lectures to graduate students in the Department of Electrical and Electronics Engineering on advanced theories and techniques in the areas of collisional broadening of molecular lines, quantitative spectroscopic measurements, and terahertz technology. Directly advised graduate students on experimental design and data analysis techniques. Presented an "enlightenment lecture" to department faculty and general audience.

California Institute of Technology, Pasadena, CA, USA

Teaching Assistant – "Fundamental Techniques of Experimental Chemistry."

1993

Instructed and supervised students in introductory undergraduate laboratory chemistry course.

Teaching Assistant – "Chemical Equilibrium and Analysis Laboratory."

1993

Instructed and supervised students in conducting experiments designed to illustrate modern instrumental techniques that are currently employed in industrial and academic research. Emphasis was on determinations of chemical composition, measurement of equilibrium constants, evaluation of rates of chemical reactions, and trace-metal analysis.

PROFESSIONAL SERVICE

Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA

Technical Excellence Committee

2008 - Present

Small Business Innovation Research Program (SBIR)

Proposal Peer Reviewer

2000 – Present

Applied Optics, Applied Physics B, Chemical Physics Letters, Journal of Molecular Spectroscopy, Science

Peer Reviewer

1999 – Present

NASA Advanced Component Technology Program

Proposal Peer Reviewer

2008

Earth System Scholars Network (ESSN)

Mission Statement Committee

2004

National Urban League Conference, Los Angeles, CA, USA

Career Fair Volunteer for JPL

July, 2002

PEER-REVIEWED, JOURNAL PUBLICATIONS

- Swain, MR; Vasisht, G; Tinetti, G; Bouwman, J; Chen, Pin; Yung, Y; Deming, D; Deroo, P. "Molecular Signatures in the Near Infrared Dayside Spectrum of HD 189733b," *Astrophys. J. Lett.*, in press, 2008.
- Trudeau, ME; Chen, P; de Andrade Garcia, G., Hollberg, LW; Tans, PP. "Stable isotopic analysis of atmospheric methane by infrared spectroscopy using diode laser difference-frequency generation," *Appl. Optics*, **45**(17): 4136-4141, 2006.
- Chen, P; Pearson, JC; Pickett, HM; Matsuura, S; Blake, GA. "Measurements of $^{14}\text{NH}_3$ in the $v_2 = 1$ state by a solid-state, photomixing, THz spectrometer and a simultaneous analysis of the microwave, terahertz, and infrared transitions between the ground and v_2 inversion-rotation levels," *J. Mol. Spectrosc.*, **236**(1): 116-126, 2006.
- Kleiner, I; Tarrago, G; Cottaz, C; Sagui, L; Brown, LR; Poynter, RL; Pickett, HM; **Chen, P**; Pearson, JC; Sams, RL; Blake, GA; Matsuura, S; Nemchinov, V; Varanasi, P; Fusina, L; Di Lonardo, G. " NH_3 and PH_3 line parameters: the 2000 HITRAN update and new results." *J. Quant. Spectrosc. Radiat. Transf.*, **82**(1-4): 293-312, 2003.

- Chen, P; Pearson, JC; Pickett, HM; Matsuura, S; Blake, GA. "Submillimeter-wave measurements and analysis of the ground and $\nu_2 = 1$ states of water," *Astrophys. J. Suppl. Ser.*, **128**(1): 371-385, 2000.
- Matsuura, S; Chen, P; Blake, GA; Pearson, JC; Pickett, HM. "A tunable cavity-locked diode laser source for terahertz photomixing," *IEEE Trans. Microw. Theory Tech.*, **48**(3): 380-387, 2000.
- Matsuura, S; Chen, P; Blake, GA; Pearson, JC; Pickett, HM. "Simultaneous amplification of terahertz difference frequencies by an injection-seeded semiconductor laser amplifier at 850 nm," *Int. J. Infrared Millimeter Waves*, **19**(6): 849-858, 1998.
- Chen, P; Blake, GA; Gaidis, MC; Brown, ER; McIntosh, KA; Chou, SY; Nathan, MI; Williamson, F. "Spectroscopic applications and frequency locking of THz photomixing with distributed-Bragg-reflector diode lasers in low-temperature-grown GaAs," *Appl. Phys. Lett.*, **71**(12): 1601-1603, 1997.
- Young, AT; Chen, P; Leung, KN; Pan, L; Ponce, D; Stutzin, GC. "Laser and spectroscopic diagnostics of H⁻ ion-source plasmas," *Rev. Sci. Instrum.*, **65**(4): 1416-1418 Part 2, 1994.
- Young, AT; Stutzin, GC; Chen, P; Kunkel, WB; Leung, KN. "Measurement of Atomic and Molecular-hydrogen in a tandem magnetic multicusp H⁻ ion-source by VUV spectroscopy," *Rev. Sci. Instrum.*, **63**(4): 2744-2746 Part 2, 1992.

CONFERENCE PROCEEDINGS/BOOK CHAPTERS (INCOMPLETE LIST)

- Traub, WA; Chen, P; Kern B. "Planetscope: An Exoplanet Coronagraph on a Balloon Platform." *Proceedings of the SPIE – The International Society for Optical Engineering*, **7010**(70103S), DOI:10.1117/12.788087
- Chen, P; Robichaud, D; Okumura, M. "Application of cavity enhanced, optical heterodyne spectroscopy to tropospheric isotope chemistry." *Abstr. Pap. Am. Chem. Soc.*, **229**: U722-U722 131-Phys. Part 2, March 13, 2005.
- Pearson, J.C.; Chen, P.; Pickett, H.M. "Photomixer systems as submillimeter oscillators and coherent test sources." *Proceedings of SPIE - The International Society for Optical Engineering*, **4855**: 459-467, 2003.
- Chen, P; Pearson, JC; Pickett, HM; Matsuura, S; Blake, GA. "A Three-Diode-Laser, Terahertz-Difference-Frequency Synthesizer and Its Applications toward Far-Infrared Spectroscopy of Ammonia and Water," in L. Hollberg and R. J. Lang (Eds.), *Trends in Optics and Photonics: Advanced Semiconductor Lasers and Their Applications* vol. 31, pp. 103-105, Washington, D.C., Optical Society of America, Washington, DC, 2000.
- Matsuura, Shuji; Chen, Pin; Blake, Geoffrey A.; Pearson, J.C.; Pickett, H. M. "Two-frequency MOPA diode laser system for difference frequency generation of coherent THz-waves." *Proceedings of SPIE - The International Society for Optical Engineering*, **3617**: 14-21, 1999.
- Li, CY; Chen, P; Stutzin, GC; Young, AT; Leung, KN; Kunkel, WB. "Laser diagnostics of the chemical-kinetics of H⁻ ion formation in a low-pressure electric-discharge," *Abstr. Pap. Am. Chem. Soc.*, **201**: 177 Part 2, 1991.
- Young, AT; Chen, P; Kunkel, WB; Leung, KN; Li, CY; Stutzin, GC. "Laser diagnostics of H⁻ formation in a magnetic multicusp ion source," *Conference Record of 1991 IEEE Particle Accelerator Conference*: 1916-1918, 1991.
- Young, AT; Chen, P; Kunkel, WB; Leung, KN; Li, CY; Watson, JM. "Quantum yield measurements of photocathodes illuminated by pulsed ultraviolet laser radiation," *Conference Record of 1991 IEEE Particle Accelerator Conference*: 1993-1995, 1991.

FIRST-AUTHORED CONFERENCE PAPERS

- Chen, P., Gordon, B., Kern, B., Nemati, B., Shao, M., Traub W., Trauger J., "Stratospheric seeing and contrast limits for a balloon-borne coronagraph," *Exoplanet Science & Technology Fair*, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, U.S.A., February 2008.

- Chen, P., Traub W., Shao, M., Trauger, J., Kern, B., Nemati, B., Netterfield, B., Kasdin, J., "A balloon-borne, planet-characterizing telescope concept," *Navigator Program Forum 2007*, NASA Ames Research Center, CA, U.S.A., May 2007.
- Chen, P., Robichaud, D. J., Yeung L., Okumura M., Yung Y. L., "Noise-immune, cavity-enhanced spectroscopy and ultra-sensitive atmospheric in-situ measurements," *Asia Oceania Geosciences Society 3rd Annual Meeting*, Singapore, Jul. 2006.
- Chen P., Robichaud D. J., Okumura M., and Yung Y. L., "A cavity-enhanced, optical-heterodyne spectrometer and its relevance to future Titan exploration," *Astrobiology Science Conference (AbSciCon) 2006*, Washington, D.C., U.S.A., Mar. 2006.
- Chen, P, Robichaud, D, and Okumura, M. "Application of cavity enhanced, optical heterodyne spectroscopy to tropospheric isotope chemistry," *229th American Chemical Society National Meeting*, San Diego, CA, U.S.A., Mar. 2005.
- Chen, P., "Development of a new technique for stable-isotope analysis of tropospheric carbon monoxide based on cavity-enhanced, near-infrared spectroscopy," *First Symposium for the Earth System Scholars Network*, Adelphi, MD, U.S.A., Sep. 2004.
- Chen, P., "Laser spectroscopy for stable-isotopic analysis of atmospheric molecules," *The Ohio State University 58th International Symposium on Molecular Spectroscopy*, Columbus, OH, U.S.A., Jun. 2003.
- Chen P., Siegel, P. H., Pickett H. M., Pearson J. C., and Wyss, R. A., "Optoelectronic terahertz sources based on photomixers," *Far-IR, Sub-mm, & mm Detector Technology Workshop*, Monterey, CA, U.S.A., Apr. 2003.
- Chen, P., de Andrade Garcia, G., Hollberg L. W., Trudeau, M. E., and Tans, P. P., "A mid-infrared spectrometer for stable-isotope analysis of tropospheric methane," *2000 Spring Meeting of the American Geophysical Union*, Washington, D. C., U.S.A., May-Jun. 2000.
- Chen, P., Pearson J. C., Pickett, H. M., Matsuura S., and Blake G. A., "Construction of a three-diode-laser, terahertz, difference-frequency synthesizer and its applications toward spectroscopy of ammonia in the v_2 state and water in the ground and v_2 states," *Sixteenth Colloquium on High Resolution Molecular Spectroscopy*, Dijon, France, Sep. 1999.
- Chen, P., Pearson, J. C., Pickett H. M., Matsuura S., and Blake G. A., "A three-diode-laser, terahertz-difference-frequency synthesizer and its applications toward far-infrared spectroscopy of ammonia and water," *3rd Advanced Semiconductor Lasers Applications Meeting*, Santa Barbara, CA, U.S.A., Jul. 1999.
- Chen, P., Matsuura, S., Blake, G. A., Pearson, J. C., and Pickett, H. M., "Molecular spectroscopy with a high-resolution, frequency-calibrated terahertz spectrometer based on optical photomixing in low-temperature-grown GaAs," *The Ohio State University 53rd International Symposium on Molecular Spectroscopy*, Columbus, OH, U.S.A., Jun. 1998.
- Chen, P. and Blake, G. A., "Spectroscopic applications of submillimeter generation by an all-solid-state, optical-heterodyne source," *The Ohio State University 52nd International Symposium on Molecular Spectroscopy*, Columbus, OH, U.S.A., Jun. 1997.
- Chen, P. and Blake, G. A., "Vibrational-rotational-tunneling spectroscopy of N₂-D₂O with an all solid state, optical heterodyne, Submillimeter-wave spectrometer," *The Ohio State University 51st International Symposium on Molecular Spectroscopy*, Columbus, OH, U.S.A., Jun. 1996.
- Chen, P. and Blake, G. A., *43rd Annual Western Spectroscopy Association Conference*, Pacific Grove, CA, U.S.A., Feb. 1996.
- Chen, P. and Blake, G. A., "Spectroscopic applications of optical photomixing at millimeter and submillimeter frequencies," *The Ohio State University 50th International Symposium on Molecular Spectroscopy*, Columbus, OH, U.S.A., Jun. 1995.

LANGUAGES

- Mandarin Chinese – native language
- English – as proficient and fluent as native speakers.

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- German – two years of college coursework, quite rusty now.
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MEMBERSHIPS

- American Association for the Advancement of Science (AAAS)
- American Chemical Society (ACS)
- American Geophysical Union (AGU)
- American Physical Society (APS)
- Asia Oceania Geosciences Society (AOGS)
- Earth System Scholars Network (ESSN)
- Optical Society of America (OSA)